Santa Clara Journal of International Law

Volume 10 | Issue 2 Article 9

5-24-2013

International Environmental Law: Can it Overcome its Weaknesses to Create an Effective Remedy for Global Warming?

John Burrit McArthur

International Environmental Law: Can it Overcome its Weaknesses to Create an Effective Remedy for Global Warming?

John Burrit McArthur*

Review of: Daniel Bodansky, *The Art and Craft of International Environmental Law* (Harvard University Press 2010).

Daniel Bodansky's *The Art and Craft of International Environmental Law*_presents its readers with a detailed, sophisticated discussion of the nature of international environmental law. It will be a useful introduction for readers coming fresh to this area of law — for law students new to the legal world, for lawyers who have operated only within a domestic legal system in which there is an accepted court hierarchy and a clear, determinate structure for resolving legal questions and enforcing the answers, for environmental activists and policymakers looking for a summary of the outlines of pertinent international law, and for intellectually curious lay readers who want to better understand the possibilities and challenges of the system that ultimately must develop and enforce rules to solve our protracted environmental problems, particularly global warming. The book explains clearly the difference between domestic and international legal systems. It describes the theories and sources of legitimacy for international legal rules, the tools available to the international environmental lawyer, and the players in the international environmental arena. Because it is a detailed overview, it can also serve as a useful checklist of ideas, methods, and approaches even for experienced lawyers.

Of greater interest and importance is Bodansky's ongoing discussion of whether the "system" or "regime" of international environmental law can be viewed as an effective system of law. He returns repeatedly to the puzzle of how one can construct a system of laws without an accepted judicial structure. This, of course, is one reason that the study (and practice) of international law is of such great interest. In the absence of a clear source for authoritative decisions, questions of legitimacy lie much closer to the surface than in settled legal systems in which *Marbury v. Madison*-type fundamentals are not reopened with every decision.

When operating within our state or federal courts, American lawyers can assume that decisions will be decided with finality and then enforced.[1] They do not have to devote a substantial part of their time to worrying about whether even a decision they win will be accepted by parties from whom they seek payment of money or changes in behavior. Yet international environmental lawyers, and those seeking changes that can only be effective through international law, as is the case of those seeking to address today's most significant environmental problems, have to concern themselves with the challenge of securing legitimacy for agreements that often will not be self-enforcing. Whether international environmental law can develop into an effective-enough system is the running puzzle in the book, with Bodansky ultimately answering the question with a qualified yes.

I. The Marked Difference Between Domestic and International Law.

Bodansky is realistic about the difference between domestic and international law and the weakness of the international system if measured by the standards we use in thinking about domestic law. He concedes that international environmental law, when judged by domestic standards, is a "dismal failure."[2] Lawyers tend to view the test of a legal system as its "legal effectiveness": whether it imposes clear, readily enforceable obligations and brings conduct in line with its decisions.[3] We think of laws already on the books and subject to court enforcement as "hard" law, while treating long-term factors that might lead to new laws as "soft" factors. Bodansky, though, argues that even international lawyers (who certainly are more comfortable than domestic lawyers in arguing from "generally accepted principles") spend too much time debating the distinction between "hard" and "soft" law. Most environmental violations do not lead to direct sanctions in any event and there is no general

* B.A. Brown University 1975; M.A. (economics) University of Connecticut 1978; J.D. University of Texas 1984; M.P.A. Kennedy School, Harvard University 1994; Ph.D. Goldman School of Public Policy, University of California (Berkeley) 2003. Mr. McArthur, whose practice is based in Berkeley, California, has litigated energy and other complex commercial cases for 29 years. He has served as an arbitrator in various cases over the last 17 years, as an expert in a variety of energy cases, and has published many articles on economic, energy, and judicial management issues. He is a Distinguished Neutral on the CPR Institute for Dispute Resolution panels for California cases and Oil, Gas and Energy cases, a member of the American Arbitration Association panels on Commercial, Large Complex Cases and its National Energy Panel, a public arbitrator for the Financial Industry Regulatory Authority (FINRA), a member of the London Court of International Arbitration, and a panelist for the International Arbitration Centres in Singapore, Hong Kong, Dubai, and Kuala Lumpur.

1. DANIEL BODANSKY, THE ART AND CRAFT OF INTERNATIONAL ENVIRONMENTAL LAW 86 (2010).
2. *Id.* at 15.
3. *Id.* at 254.

"system of legalized dispute settlement" to adjudicate disputes.[4] "[C]ourts and arbitral tribunals still play only a minor role in addressing international environmental problems."[5] The most common route to resolving these problems remains under the law of state responsibility, which generally is enforced through bilateral agreements developed in state-to-state negotiations,[6] not adjudicated resolutions.

Parallel to the lack of a single accepted judicial system for establishing authoritative decisions is the lack of an enforcement system. Enforcement has, Bodansky admits, never been "the strong suit of international law."[7] It requires detection and effective remedies. Developing a policing system is difficult when states' interests in enforcing common rules so frequently founder on externalities and the lure of free riding.[8]

The difference between this challenge for environmental norms and the voluntarily agreed system of private, often arbitrated international commercial disputes can readily be seen. At the outset of what usually is a contractual relationship, the parties to an international business transaction — say, companies from different countries who are parties to a sales agreement — ordinarily agree on a contract with enforcement provisions, select a particular court jurisdiction or arbitration rules, and do so with one eye on enforceability. The

4. *Id.* at 99–102.
5. *Id.* at 203; *see also id.* at 247 (claiming that traditional dispute resolution plays a negligible role in international law).
6. *Id.* at 247; *see also id.* at 203 (stating that the primary way that internationally broad standards get converted into specific rules is through negotiations). *Bodansky adds that* "the provisions in multilateral environmental agreements regarding traditional dispute resolution have gone almost completely unused." Id. at 243.
7. *Id.* at 226 (noting the lack of an ultimate judicial authority in the international system). *See* HELMUT BREITMEIER ET AL., ANALYZING INTERNATIONAL ENVIRONMENTAL REGIMES: FROM CASE STUDY TO DATABASE 152 (2006) (asserting that state sovereignty is one of the foundations of international law, and at the same time, one of the major barriers to the adoption of international rules). *But cf.* ALEXANDRE KISS & DINAH SHELTON, INTERNATIONAL ENVIRONMENTAL LAW 11–12 (2007) (stating that the view that international law is significantly weaker than domestic legal regimes is not universal). *See also* RODA VERHEYEN, CLIMATE CHANGE AND INTERNATIONAL LAW: PREVENTION DUTIES AND STATE RESPONSIBILITY 67–68, 81–83, 282–88 (2005) (arguing that customary principles of international law provide adequate tools to deal with global warming).
8. Self-interest and free riders are major problems in interstate relations. In the battle against global warming, for instance, one could summarize the history as proving that most states want aggressive steps taken against global warming but want other countries to pay for it. Developed nations want developing countries to be responsible for their rapidly growing emissions and burgeoning populations, and have used their dislike for the differentiated responsibility principle as an excuse to refuse to take their own steps, as the United States Senate displayed in its 98:2 adoption of the Byrd-Hagel resolution. *See infra* note 168. Developing countries point to developed nations' historic responsibility for filling the atmosphere with long-lived pollutants, ignore the role of their greater population growth in increasing emissions, and say they should not have to begin limiting emissions. Developing countries have an incentive to support measures based on per-capita emissions, not total emissions, because this removes the rise in emissions caused by population growth. ~~from the equation~~. A similar battle plays out industry by industry when states begin thinking about the internal structure of greenhouse-gas limits. Many industries ~~may~~ pay lip service to the need to take action, ~~do something~~, ~~sometime~~, but each has special reasons, such as jobs, economic growth, the cost of replacing sunk investments, and technological infeasibility, as to why *their* industry should have favored status. A timely contemporary example ~~a fascinating example~~ of self-interest and free riding is unfolding in the struggle within the European Union to stabilize both the euro and member-nation public finances. Every country wants a strong euro and to benefit from it; none are particularly eager to volunteer for the costs of funding currency supports or for limiting public expenditures.

relationship is founded upon a shared expectation of gains from having a mutually accepted dispute-resolution system that both sides deem fair enough to settle future disputes. Most of the anticipated losses and gains are expected to be internal to the relationship. There is little fear that third parties will capture large benefits or escape significant costs.

It is no surprise that businesses in different countries, and governments contracting with foreign businesses, routinely agree to arbitrate disputes under the aegis of one of the international arbitration organizations. In this way, they legitimate a structure for their particular transaction.[9] Over time, repeat use of the same arbitration system by a large number of parties can rise to a level in which a given international arbitration-service provider's docket begins to look like an independent court system.

International environmental disputes, in contrast, unlike international business transactions, generally do not fall under an agreed system. The polluter and its victims usually are not in a contract relationship. Yet there is no settled system of international environmental law to parallel, on a larger scale, domestic rules. Much of The Art and Craft of International Environmental Law is devoted to explaining how, in the absence of such a system, the world can develop a coherent system to deal with cross-border environmental degradation.

II. The Pragmatic Art and Craft of International Environmental Law.

One of the best aspects of Bodansky's book is his catalogue of the techniques through which international environmental legal rules have been developed even in the face of the major obstacles. Chapter Four, for instance, begins with a discussion of the possible goals of environmental controls. These range from the "absolutist" goal of forbidding particular environmental harms to balancing approaches, an area where Bodansky focuses mainly on cost/benefit analysis, and alternative goals: environmental effectiveness, cost effectiveness, and equity.[10] It moves on to who should be regulated — states or "private actors."[11] The chapter concludes with a useful discussion of nine kinds of information regulation, as well as traditional "command-and-control" regulation (whether through "specification," "performance," or "environmental quality" requirements), and, finally, of "market-based" rules. Market rules include not just taxes, charges, subsidies, tradable allowances, and price and quantity regulations, but also liability rules.[12] For the unversed, the range of potential

9. *Chavez Says Venezuela Won't Accept World Bank Arbitration*, BLOOMBERG BUSINESS WEEK (Jan. 10, 2012), *available at* http://news.businessweek.com/article.asp?documentKey=1376-LXHUWK1A74E901-7A3SE6B1K0ETEMM47QS3JH7K9T (discussing Venezuela's receipt of a favorable arbitration award under the auspices of the International Chamber of Commerce, and that the path of state-company international arbitration remains a work in progress).
10. Bodansky, *supra* note 1, at 57–70.
11. *Id.* at 70–71.
12. *Id.* at 71–84; *see* Trail Smelter Arbitration (U.S. v. Can.), 3 R.I.A.A. 1911 (1941). Bodansky includes the *Trail Smelter* case under the rubric of liability rules. Treating liability rules as a "market" device is in the Chicago School tradition. If, as Ronald Coase argued, parties can bargain to the optimal use of resources from an initial allocations, *see* Ronald Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (1960), then liability rules can be used to add externalities and other social costs that the parties should include in their bargain.

measures will be an eye opener. Even for the environmental veteran, it should be useful to see the plenitude of policy approaches listed in one place.

Chapter Six continues the stress on a much broader vision of law than "hard" domestic law in its survey of "Who's Who in the Legal Process." It discusses not only states and international institutions, such as the United Nations Environment Programme (UNEP), but also non-governmental organizations (NGOs) and business. Bodansky includes both "sources of influence" and "pathways of influence" in his NGO discussion[13] in order to remind readers that, in the absence of a world legislature or world environmental court, individuals seeking change often have to consider a wider range of allies and options than when pushing for legal rules in the United States.[14] A broader framework is of course appropriate to a system in which courts are supposed to enforce generally accepted principles. Bodansky lists four of these "nontreaty norms" applicable to international environmental law: (1) the precautionary principle, (2) the duty to prevent transboundary harm, (3) the duty to protect endangered species, and (4) the duty to future generations.[15] It is fair to say that the world's collective response to date to its largest environmental problem, global warming, has not truly honored any of these four principles.

Similarly, Chapter Eight, on negotiating agreements, is in part a pointed reminder of the frequent benefits of non-legal agreements, which ordinarily are easier to change than tight legal agreements. It is also a reminder that fully inclusive participation in international environmental agreements, while a long-term goal, may not be necessary for success. As Bodansky writes on today's key environmental challenge, because twelve countries are the source of 80% of greenhouse gas emissions,[16] "broad participation is not essential to solve the climate change problem."[17]

Bodansky offers a similarly nuanced position on the contents of international environmental agreements. While a "deep" agreement with extensive requirements may seem, *ceteris paribus*, better than a loose compact with many gaps, a policy of "starting broad and deepening" may ultimately trump one of "starting deep and broadening"[18] — or

13. BODANSKY, *supra* note 1, at 108–135.
14. *Id.* at 124–130. In fact, the path to change is broader even for domestic legal systems than lawyers ordinarily consider, but it is fair to say that the proportion of rules that are already settled and enforceable through a hierarchical court system, including in the environmental area, is much higher for most domestic legal systems than in the international sphere and its country-to-country relationships.
15. *Id.* at 191.
16. *Id.* at 175. Although one would like to write that twelve countries are "responsible" for or "liable for" 80% of global warming, that would not be accurate because there is not yet an international regime effectively holding countries to account for the emissions that emerge from their territories.
17. *Id.*
18. *Id.* at 183–87; *see id.* at 186 (identifying as initially broad agreements that succeeded in deepening over time the 1976 Barcelona Convention for the Protection of the Mediterranean Sea Against Pollution, the 1979 Long-Range Transboundary Air Pollution Convention, the 1985 Vienna Convention for the Protection of the Ozone Layer and 1987 Montreal Protocol, the 1992 United Nations Framework Convention on Climate Change established in Rio de Janeiro and 1997's Kyoto Protocol (certainly an example on which the jury remains very much out), and the 1979 Bonn Convention on Migratory Species).
Bodansky suggests a variety of ways in which looser agreements may foster long-term environmental progress. Negotiating an agreement with a small number of countries may make it easier to develop cohesiveness and expertise. *Id.* at 174-75. Differential standards, though they raise

attempting to start both deep and broad. Critical agreement provisions include updating processes and scientific review so that policymakers have the basis to enhance agreements over time, adding countries and rules if an initially broad agreement does not secure the desired pollution reductions. Bodansky emphasizes pre-negotiation steps and diverse processes and later argues that the conference of the parties has emerged as "a new form [and clearly, in his view, a frequently effective form] of international cooperation."[19]

The seriousness of Bodansky's treatment of soft law explains another distinguishing feature of his book, his detailed consideration of the ways in which new values ("norms," in his terminology) can be developed. His list of the reasons why states and other actors would consider agreeing to binding solutions to environmental problems range from self-interest (which he rejects as far too narrow to explain all behavior) to psychological and social factors that might lead states to limit their behavior voluntarily.[20] His message is that even successful international environmental agreements tend to come not from the satisfyingly hard process of an inspired, creative lawyer bringing a lawsuit that shuts down a polluter. Much more important in this system without a head, particularly because so much of environmental law is based on negotiated agreements, is "the state of mind of the actors that comprise the relevant community"[21] — those whose behavior needs to change, or the states that can compel their behavior to change. Bodansky believes that changes in values can be more powerful than changes in rules. With luck, the evolution of norms and development of more effective procedures for reaching agreement will prove adequate to the challenges of the day.

Bodansky focuses much more on what makes a norm than on whether the result is a "hard" legal rule or "soft" principle followed voluntarily. In describing the "complex" model through which norms emerge, he follows the "garbage-can" model of theorists Michael Cohen, James March and Johan Olsen,[22] an approach famously applied to policymaking in the United States, and explained in political scientist John Kingdon's Agendas, Alternatives, and Public Policies.[23] Bodansky's emphasis on the wide range of actors and techniques that can get an issue on the policy agenda and turn it into an agreement stems from this approach.

obvious questions of fairness, may encourage participation, particularly by countries that lack the capability to institute major changes. *Id.* at 182. Paradoxically, non-legal agreements may be preferable in some circumstances because they can be easier to change, do not require ratification, and can also be updated much more easily. *Id.* at 155-56, 187.

19. *Id.* at 269–70. There have been 17 conferences of the parties under the Framework Convention on Climate Change, for instance, and while these have yet to produce a specific *and binding* allocation of emissions reductions by country, the conferences have attracted worldwide publicity and kept global warming unavoidably on the world policy agenda.
20. *Id.* at 89–93.
21. *Id.* at 101.
22. *See, e.g.,*. Michael Cohen, James March & Johan Olsen, *A Garbage Can Model of Organizational Choice*, 17 ADMIN. SCI. Q. 1 (1972). Although Bodansky does not cite this seminal article, he elsewhere cites another part of March and Olsen's body of work. *See* BODANSKY, *supra* note 1, at 91 n. 29.
23 . JOHN KINGDON, AGENDAS ALTERNATIVES, AND PUBLIC POLICIES (2d ed. 2003); *see also* CHARLES LINDBLOM & EDWARD WOODHOUSE, THE POLICYMAKING PROCESS (3d ed. 1993). As described in a book that is one of its most potent applications, the garbage-can model analyzes decisions in which participants have inconsistent preferences, the way that the decision-making institution functions is unclear, and participants combine and dissolve in fluid patterns, by looking at the "streams" of four

Among the important features of this policy-stream model is that it allows a much bigger role for sources of change that are not part of formal political processes — for instance, roles for "policy entrepreneurs" and for scientists — and for unexpected events to set the agenda. By focusing on the need for issues to get and remain on the policy agenda, it can encompass a wider range of factors that may alter the lawmaking process than can traditional rule-based analyses. Lawyers, groups, and scientists concerned about the environment have played vital roles in securing change. Bodansky mentions the examples of scientists who realized that the ozone hole was growing[24] and the role of the Intergovernmental Panel on Climate Change (IPCC) in keeping global warming on the agenda and shifting that agenda to more serious remedies as too well known to need detailing. The impact of Rachel Carlson's Silent Spring in spurring the environmental movement is an exogenous event that spawned widespread change.[25] Key disasters such as the Torrey Canyon oil spill,[26] the Chernobyl nuclear disaster, the oil crisis in the 1970's, the Exxon Valdez oil spill, and BP's recent Macondo spill in the Gulf of Mexico are all examples of key events that put major environmental issues on the agenda in a way that ordinary legal efforts could not have matched.

The expansiveness of this model shows up in the variety of forces Bodansky identifies as possible reasons why nations adopt treaties, in the breadth of the actors whom he considers as possible sources of new environmental rules, and, ultimately, in his optimism about the development of new values and rules. His list of "sources" of international environmental norms, which ultimately form his key units of analysis, includes (beyond the bread-and-butter legal material of judicial and arbitral decisions) not just treaties and decisions of treaty bodies, but decisions of international organizations, conference resolutions and declarations, "claims" (formal positions) by states, business codes of conduct, and ideas propounded by legal scholars and experts.[27] Norms may emerge from "more diffuse processes" than treaties, and even more general than these are general principles of international law, yet all, Bodansky claims, are part of "hard law." "Soft" sources of international environmental norms cover, in his classification, international resolutions, conference declarations, and business codes of conduct.[28] It is no surprise that, with this broad vision, Bodansky does end up with an equally expansive list of reasons why states would join international environmental agreements and why they would implement their commitments.[29]

factors: problems (and how they get on a decision agenda), solutions (including the existing state of know-how on any particular problem), participants, and "choice opportunities" – decisions to which solutions can attach. KINGDON, *supra*, at 84-86.

24. BODANSKY, *supra* note 1, at 30, 137.
25. Rachel Carlson published her seminal book in 1962. *See generally* J. EDWARD DE STEIGUER, THE ORIGINS OF MODERN ENVIRONMENTAL THOUGHT ch. 3 (2006).
26. BODANSKY, *supra* note 1, at 27, 138 (Bodansky listing the *Torrey Canyon* and *Argo Merchant* oil spills as events that produced major changes in ocean oil-pollution law).
27. *Id.* at 94–96; *see id.* at 98 (grounding his analysis more closely in a formal institution with at least some formal recognition, Bodansky cites Article 38 of the Statute of the International Court of Justice with its tri-partite listing for formal sources of international law in treaties, custom, and generally accepted principles of law).
28. *Id.* at 98–99.
29. *Id.* at 159–66 (list of reasons why states may join environmental agreements ranging from the law merely codifying an existing state practice, to self-interest, to doing the right thing under the state's values, getting others to join, and because of other relationships with other states or other actors).

In domestic law, legal norms have preferential status because they can be sanctioned and because courts will apply such rules.[30] It makes sense for domestic lawyers to focus on hard law — and, indeed, on a relatively narrow part of "hard" law. In common-law systems, arguments from custom and generally accepted principles, often dressed up as policy arguments, frequently lose to more specific arguments from contract language, a case, or statutory text. But Bodansky claims that international law is different for the reasons mentioned at the outset: "At the international level, there is no general system of legalized dispute settlement, which can adjudicate violations of legal norms. In most cases, dispute settlement is not available, regardless whether a norm is legal in nature."

What matters more to Bodansky in a practical sense, and what makes a norm hard or not, is, as already discussed, "the state of mind of the actors that comprise the relevant community."[31] From this norm-oriented position, Bodansky proposes classifying international environmental norms on gradients of strength based upon whether they are produced in a "purposive process of norm creation," are consensual, the extent of their mandatory nature, their precision, and whether they are self-implementing or subject to an external enforcement system.[32] One reason Bodansky focuses so heavily and optimistically on changes in norms, rather than hard agreements, may be that he also does not believe that normal measures of compliance are the best measure of effectiveness.[33]

On implementation, Bodansky's reasons range from a state's feeling that it "ought" to implement its commitments to the underlying norms influencing behavior and the positive or negative consequences of not implementing an agreement. *Id.* at 220-21. All of these factors are filtered through the complex forces that may influence the state's political system. *Id.* at 221-23. Bodansky is also comforted by empirical studies that, he claims, show that states generally implement their international agreements, so that insincerity is the exception and not the rule, once a state has made a formal commitment. *Id.* at 229.

Bodansky offers a similarly nuanced model of why states might *not* participate in or implement an agreement. *Id.* at 228-31. He devotes more attention to the conditions under which states will enter an international environmental agreement than to those that might lead it to fail to perform, perhaps at least in part because of his belief that empirical studies show that states generally implement the treaties they join, so that "insincere ratification represents the exception rather than the norm." *Id.* at 229.

30. *Id.* at 100–01.
31. *Id.* at 101.
32. *Id.* at 102–06.
33. *See id.* at 30. Bodansky is skeptical that the law of state responsibility, which he characterizes as being overly legalistic, static, and formalistic, is as good a way of approaching international environmental problems as "flexible, political approaches, involving a wider variety of actors, which investigate the sources of non-compliance in a particular case and find appropriate responses." *Id.* at 247-48.
Moreover, simple compliance may be a bad indicator of effectiveness, because an environmental law may simply have set low standards, *id.* at 258 (as did Kyoto). In the long term, tight legal requirements may not maximize desired behavior, compliance may not be the best predictor of desired results, and tight agreements allowing little exit may be self-defeating because they may discourage participation. *Id. at 270-71.* All of these points support Bodansky's larger theme that building support for environmental controls may be far more important than securing the most logical agreement as soon as possible.

This does not mean that Bodansky ignores compliance. His book contains a detailed chapter on compliance mechanisms, including very useful sections on securing compliance by a variety of information-gathering mechanisms and by providing financial assistance. *Id.* at 238-45.

The garbage-can model of policymaking is liberating because it suggests that a broad range of groups have available a wide variety of policy tools they can wield to effectuate change. Environmental groups have many avenues open for influence. At the same time, the model suggests that those opposing change have similarly broad opportunities, as indicated by the success that business groups in the United States have had in blocking meaningful progress against global warming.[34] The challenge to models broad enough to capture all possible sources of change is the same as the challenge of Parsonian social theory in the middle of the last century.[35] Parson's model of social action was so inclusive that it could incorporate any source of change within psychological, political, economic, social, and cultural systems — a great strength of his theory — just as the garbage-can model incorporates many paths to political change. But with such broad approaches it becomes harder to generate predictions in any given situation. The model may explain change better after the fact than narrower theories, but it has more trouble predicting change and providing assurance that real change will be coming.

III. Successes and Failures.

To bolster his claim for the effectiveness of norm-based shifts, Bodansky discusses the success of various international environmental agreements. As background, he divides the evolution of that body of law over the last two centuries into three phases. In its formative years, in the late nineteenth and first half of the twentieth century, it was primarily a law among states, concerned with how states could cooperate on limited economic measures. The threats addressed had a narrow focus upon fairly obvious environmental hazards with clear causal relationships; agreements targeted the rational use of resources; the actors were states, not firms or private individuals; the emphasis was on coexistence among states, not cooperation; and resources beyond national boundaries, like oceans, tended to be treated as inexhaustible.[36] This period did see some state treaties on species preservation — Bodansky focuses particularly on treaties over birds and other wildlife and the 1911 North Pacific Fur Seals Convention.[37]

In a second phase, that of "pollution prevention," emphasis shifted to preventing transboundary harm and to multilateral agreements; progress involved, in some instances, agreements binding on private entities; but the focus remained relatively narrow compared to today's concerns.[38] This movement was linked to the environmental consciousness that culminated in the 1970's Earth Day celebration and Principle 21 of the Stockholm Conference

34. *See generally* Judith Layzer, *Deep Freeze: How Business Has Shaped the Global Warming Debate in Congress, in* BUSINESS AND ENVIRONMENTAL POLICY: CORPORATE INTERESTS IN THE AMERICAN POLITICAL SYSTEM 93–125 (Michael Kraft & Sheldon Kamenikci eds., 2007); LINDBLOM & WOODHOUSE, *supra* note 23, at 62–69.
35. *See generally* TALCOTT PARSONS, THE STRUCTURE OF SOCIAL ACTION (1937); TALCOTT PARSONS, THE SOCIAL SYSTEM (1951); Talcott Parsons, *An Outline of the Social System, in* TALCOTT PARSONS, THEORIES OF SOCIETY 30–79 (1961).
36. BODANSKY, *supra* note 1, at 21, 24–25.
37. *Id.* at 18–23 (discussing 1911 North Pacific Fur Seals Convention, 1902 Convention to Protect Birds Useful to Agriculture, and 1916 Migratory Birds Convention between the United States and Canada and a 1936 treaty between the United States and Mexico).
38. *Id.* at 21, 26–30.

in 1972. Principle 21 was itself a broader endorsement of the 1941 Trail Smelter principle, one emerging from an arbitration, that states have a duty -- i.e., something stronger than a discretionary privilege to agree -- to prevent trans-boundary harm.[39] In 1972, the same year as the Stockholm Conference, the United Nations developed UNEP, one of the primary sources of environmental influence, and it has played a "coordinating and catalytic role" ever since.[40]

In the United States, this was the era of breakthrough legislation in the National Environmental Policy Act, the Clean Air Act, and the Clean Water Act as well as establishment of the Environmental Protection Agency.[41] One sign of the breadth of support for environmental progress at this time is that these steps occurred under a Republican President. Although the issues were broader than in the first phase, the environmental movement still was largely a developed-country phenomenon.[42] The era was marked by progress in multi-lateral treaties, but Bodansky's examples (the various treaties on ocean pollution from tankers) are still relatively narrow (if effective) environmental laws.[43]

In a third era, the one of greatest relevance because it encompasses issues of much broader scope, particularly climate change, by far today's most important environmental challenge, and because it is the phase still emerging today, emphasis shifted to what Bodansky calls "sustainable development."[44] The problems now being addressed are much more intractable because they "may require fundamental economic and social change."[45] The issues present greater scientific uncertainty, which, among other things, allows those resistant to change to hide behind the lack of absolute certainty.[46] For example, business interests and their political allies bottled up progress on climate change in the United States Congress by rejecting the precautionary principle and requiring a level of certainty that is rarely met in any decision-making.[47] The issues often present a "North-South," developed-developing country divide and can require solutions that involve capacity building and developed-country

39. *Id.* at 26–27; *see* United Nations Conference on the Human Environment, Stockholm, Sweden, June 15-16, 1972, *Declaration of the United Nations Conference on the Human Environment*, Principle 21, U.N. Doc. A/CONF.48/14 (June 16, 1972) [hereinafter Stockholm Declaration]. Principle 21 balances sovereign states' right to exploit their own resources with "responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or areas beyond the limits of national jurisdiction." *Id.*
40. BODANSKY, *supra* note 1, at 29.
41. See generally id. at 26.
42. *Id.*
43. *See id.* at 26–29 (discussing 1954 adoption of International Convention of the Prevention of Pollution of the Sea by Oil (OILPOL), the 1958 Convention on the High Seas to forbid ocean dumping and the conventions adopted after the *Torrey Canyon* oil spill in 1967, as well as the convening of the Stockholm Conference to begin dealing with the problem of acid rain).
44. *Id.* at 21, 30–35.
45. *Id.* at 31. Indeed, so far real progress on global warming can be said to have been derailed by developed countries' unwillingness to jeopardize their economic and social position, even at the cost of climate disaster, and developing countries' unwillingness to limit their steps toward quickly achieving an economic and social breakthrough that would let them draw even with developed countries, even if incurring the same global risk.
46. *Id.* at 32–33.
47. John Burritt McArthur & Rick Harper, *Global Warming, the Regulations Ahead, and the Oil and Gas Industry*, 48 NAT. RES. J. 745, 774–79 (2009).

funding for their developing brethren, as was the case with ozone regulation.[48] In addition to the challenge of severe divisions between rich and poor countries, effective solutions require surmounting intergenerational challenges.[49] The economic interests of those alive today stand in direct, material conflict with those of future generations — even if both should share an abstract desire to protect the habitability of the world. Not surprisingly, solutions involve much longer periods of time (and, unfortunately, delay in enacting measures against climate change carries huge costs) and more complex planning than the challenges of the first two phases of environmental law.

In charting developments across these three periods, Bodansky gives a realistic picture of the successes and failures in international environmental law.

The successes, which are marked, are the fairly standard catalogue of specific, relatively limited programs in which solutions were available, national and international economic growth was not jeopardized, and compliance could be monitored fairly effectively.

For instance, Bodansky treats the "first multilateral problem to receive international attention," oil pollution from tankers, as a success with its progression from the 1954 International Convention for the Prevention of Pollution of the Sea by Oil (OILPOL), the 1958 Convention on the High Seas, and the tightening of standards after the Torrey Canyon spill in the Oslo Convention (Bodansky claims that as a result, today there is "virtually no hazardous waste . . . disposed of in the North Sea"[50]) to the 1972 London Dumping Convention and the 1973 International Convention for the Prevention of Pollution by Ships (MARPOL).[51]

A second example comes from rules against acid rain, a problem that led to the Stockholm Conference in 1972 and, in addition to effective measures against acid rain, to the broader impact of the Stockholm Declaration's Principle 21.[52] Third are the concerted efforts against ozone pollution that generated the Montreal Protocol and its subsequent tightening after scientists determined that the hole in the atmosphere was growing even more rapidly in spite of initial reforms.[53] Bodansky describes the agreement on ozone as "widely considered to be the most successful environmental agreement to date."[54] And, finally, he mentions the 1911 North Pacific Fur Seals Treaty, claiming that by 1940 the seal population had "returned to its pre-hunt levels."[55]

48. BODANSKY, *supra* note 1, at 32.
49. *See id.* at 34.
50. *Id.* at 259.
51. *Id.* at 20, 27, 31, 159-60; *see id.* at 259–60 & n. 29 (Bodansky claiming that ocean pollution from tankers declined from 1,080,000 tons in 1975 to just 16,000 tons in 2002).
52 . *Id.* at 28.
53. *Id.* at 30–32, 260.
54. *Id.* at 30–31; *see accord*, U.N. DEV. PROGRAMME, HUMAN DEVELOPMENT REPORT 2007/2008 – FIGHTING CLIMATE CHANGE: HUMAN SOLIDARITY IN A DIVIDED WORLD 154 (2007), *available at* http://hdr.undp.org/en/media/HDR_20072008_EN_Complete.pdf (last visited Apr. 2, 2012) (calling Montreal Protocol "[p]erhaps the most successful of all international environmental treaties").
55. BODANSKY, *supra* note 1, at 260; *see id.* at 82 (the EPA's experience with cap-and-trade regulations for sulfur is frequently cited as another unexpected success story in environmental regulation); *see generally* JEFF GOODELL, BIG COAL: THE DIRTY SECRET BEHIND AMERICA'S ENERGY FUTURE 240 (2007); Panel Discussion, *EBA Climate Change Primer: Cap and Trade*, 29 ENERGY L.J. 173, 176–77 (2008) (comments by Brian McLean, Director, EPA Office of Atmospheric Programs).

Arrayed against these positive examples of successful cooperation are areas that Bodansky describes as showing little or no progress. For instance, the Trail Smelter arbitration, one of the few adjudicated international environmental disputes to yield a written precedent, remains to his count "after more than fifty years . . . still the only case in which a state was held internationally responsible for causing transboundary environmental harm."[56] The arbitration was "successful" in establishing a rule that gets lip service, but has not had the desired effect on behavior. "[T]ransboundary pollution seems more the rule than the exception in interstate relations."[57] "States acknowledge a duty to prevent significant transboundary harm but go on causing such harm."[58] "Pollutants are carried across most international borders continuously through the air and by rivers and ocean currents."[59]

Bodansky likens the ineffectiveness of the principle against transboundary harm to that of rules against torture. Torture is prohibited by customary international law.[60] Victims have better legal protection than the environment, and rules against torture are sometimes enforced against individuals by the International Criminal Court at the Hague. This is an advantage for human rights protection over international environmental protection. Yet torture remains "widespread throughout the world."[61]

In another cautionary example, Bodansky notes that even as seemingly concrete an achievement in international law as the International Whaling Commission's very specific rules against unrestricted whaling, which seemed such a concrete, adequate set of rules when adopted, failed for many years because they did not detect systematic cheating by the Soviet Union as it killed over 100,000 whales between 1948 and 1987.[62] Success in establishing a hard rule was defeated for four decades by a failure to detect and punish.

Indeed, when Bodansky lists the major environmental challenges facing the international community today, he paints a daunting picture:

- Despite the adoption of the Convention on Biological Diversity in 1992, an estimated 50 to 150 species continue to be lost every day. The World Conservation Union estimates that almost one in four mammals and one in eight birds face a high risk of extinction in the near future.
- Almost two decades after the emergence of global warming as a significant political issue, global emissions of greenhouse gases continue to grow at a rate of roughly 1.9 percent per year, and the entry into force of the Kyoto Protocol in

56. BODANSKY, *supra* note 1, at 200. Bodansky does elsewhere include the *Lac Lanoux* arbitration as a second important adjudicated decision, one that established a duty to at least consult and negotiate in good faith. *Id.* at 95. A common example of the impotence of the international regime to punish even the severest pollution by a state is the inaction after the radioactive emissions from the Chernobyl nuclear disaster, which somewhat extraordinarily did not see a single affected state take legal action. KISS & SHELTON, *supra* note 7, at 24. There would have been a remedy had the Soviet Union signed the Vienna Convention on Civil Liability for Nuclear Damage, but it had not. *Id.*
57. BODANSKY, *supra* note 1, at 198–99.
58. *Id.* at 202.
59. *Id.* at 198–99.
60. *Id.* at 199.
61. *Id.* (using torture as his example, Bodansky argues that there is a wide gap between the theory of customary law, "which emphasizes consistent and uniform state practice," and the international norms described as customary, which often are honored mainly in the breach).
62. *Id.* at 225.

> February 2005 has done little to slow this trend. [In fact, unexpectedly rapid economic growth in China and India and other developing countries seems likely to cause an unexpected increase in the rate of emissions.]

- An estimated 12 million hectares are lost to deserts each year, despite the adoption in 1994 of a treaty to combat desertification.[63]

Bodansky's overall position on these successes and failures emerges when he answers his own question of whether the international environmental regime is effective with a "qualified yes."[64] He finds the record thus far cause for optimism:

"The proliferation of international environmental norms is all the more remarkable given the infirmities of the international legal process."[65] From his perspective, the "brief history" of international environmental law already has had "some notable successes" and has been marked by "impressive ingenuity, developing a wide range of mechanisms to set standards and promote implementation."[66] It has led to "[r]egular scientific assessment" to build consensus, soft law instruments like codes of conduct, framework conventions and protocols to foster incremental progress, tacit amendment procedures, differential standards by ability to pay, and elaboration of decisions in a process that is widely accepted even if not formally binding.[67]

IV. The Greatest Crisis: Global Warming.

If the world only faced environmental challenges like the preservation of birds, seals, whales, and the reduction of limited-use pollutants like chlorofluorocarbons or even sulfur, it would be possible to rest comfortably with Bodansky's faith that the gradual evolution of environmental norms and progress in developing new procedures to reach and extend agreements will keep pace with environmental problems. The advances would not be perfect, not without unnecessary loss, not without disappointments, but nonetheless ultimately would be successful. But this is not the position facing the world. A massive body of evidence suggests that the world is courting a disastrous increase in temperature by its refusal to face the cost of limiting emissions. Concomitant damage ranges from melting glaciers and rising sea levels to increased drought and floods. The pace of change and cost of remedies is rising

63. *Id.* at 260 (footnote omitted).
64. *Id.* at 265. To the argument that the overall record is one of failure, Bodansky responds:

> To my mind, this is an overly harsh assessment. Yes, the looming threat of global warming, the deterioration of many ecosystems, and the high rates of species extinctions should disabuse us of too optimistic an outlook. At the same time, international environmental law has had significant successes—the Montreal Ozone Protocol and the North Pacific Fur Seals Convention, to name two—so we should not write if off either.

Id. at 267.
65. *Id.* at 136.
66. *Id.* at 269.
67. *Id.* To Bodansky, this kind of incremental technical advance is likely to yield progress. *Id.* He believes that history has shown that we are far more likely to generate environmental progress incrementally by dedicated focus on individual problems than by putting hopes in attempting to create a powerful new international regime. Bodansky also believes that the effort that would be involved to create an international environmental regime might well outweigh the benefits. *Id.* at 268. Yet he admits, quite rightly given the experience of the last few decades, that it is difficult to see how to address climate change without stronger international institutions. *Id.*

rapidly with increases in emissions and temperature. The substantial risk of irreversible worldwide damage makes this the most important place to test Bodansky's arguments.

In *Collapse*, his survey of vanished civilizations, geographer Jared Diamond argues that a variety of well-established civilizations disappeared when, after surmounting various environmental challenges, they came to a point where they no longer could overcome the environmental degradation they had caused.[68] When collapse came, it usually was rapid, with the civilization disappearing. Diamond argues that reasons for these catastrophes ranged from failure to understand a new challenge on the one hand, to societies that understood that they were threatened by vanishing resources but were unwilling to make the sacrifices to devise a cure on the other.[69] He believes the "most frequent" reason for a civilization's letting itself be destroyed through scarcity is the "most surprising":[70] it understood the threat but failed to try to solve it. Among his hypotheses for this seeming irrationality are the tragedy of the commons[71] (that self-interested behavior overcame the collective interest) and domination by elites who believed that their privileged position would save them, if not their society, from the effects of environmental disaster. [72]

Diamond's prognosis fits painfully onto the history of the last two decades. Global warming cannot fall into the category of misunderstood crises, because an overwhelming body of widely disseminated evidence demonstrates that human activity that emits greenhouse gases into the atmosphere is causing a rise in temperature at unprecedented levels, and that the consequences will be severe. Global warming has remained on the international political agenda in large part, as the policy model applied by Bodansky well explains, because scientists have been able to document a crisis much more severe than any single oil spill or other isolated environmental catastrophe. At least some effects of warming have appeared in very graphic ways. The full impact may be long-term, the causal connections not as intuitive as those involved in other policy problems, and climate change even may appear, from the perspective of day-to-day life in which the air we breath does not feel different, as a problem that can be avoided if one has faith that miraculous technological fixes will appear. Yet the issue will not go away. Cures will require a major change in the consumption of fossil fuels and patterns of land use.

A. The Problem of Global Warming.

In 1988, the United Nations Environment Program and the World Meteorological Organization formed the Intergovernmental Panel on Climate Change. They assembled a

68. JARED DIAMOND, COLLAPSE: HOW SOCIETIES CHOOSE TO FAIL OR SUCCEED (2005) (examples include the Maya, Anasazi, various Norse settlements, tribes in New Guinea, and the clans on Easter Island).
69. *See generally id.* ch. 14.
70. *Id.* at 427.
71. *See* Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243 (1968) (classic argument that the disappearance of the commons was a triumph of individual aggrandizement over collective interest). For an argument that societies can, in fact, cooperate over long periods of time, *see* ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION (1990).
72. DIAMOND, *supra* note 68, at 428–31.

large, diverse body of scientists who could identify areas of international consensus on global warming.[73] The IPCC is an unusual and vitally important agency. It is the closest thing the world has to a body representing the international community in a collective effort to develop reliable knowledge about climate change.

The IPCC has issued four reports. Its Third Assessment report, issued in 2001, was the first to put confidence ranges around findings on the effects of global warming.[74] The Fourth Assessment Report,[75] issued in 2007, is its most recent full report. The Fifth Assessment Report is underway and scheduled for completion in April 2013.[76]

In its Fourth Assessment Report, the IPCC found that 11 of the last 12 years had been the warmest on record since 1850.[77] The atmospheric level of carbon dioxide (CO_2), the most pervasive greenhouse gas (GHG), was 379 parts per million (ppm), the highest level in the last 650,000 years, and the IPCC found that the increase is very likely due to production and consumption of fossil fuels and emissions from agriculture.[78] It determined with high confidence that the regional consequences of climate changes include increased melting in mountain, permafrost, and Arctic/Antarctic areas and rising ocean levels.[79]

73. For background on the IPCC and its formation, see VERHEYEN, *supra* note 7, at 18–20.
74. The Third Assessment Report was the first IPCC report to assign confidence intervals to predicted effects of climate change. *Id.* at 26. Among other things, the report found it very likely that the global surface temperatures had increased by 0.6ºC, and that ocean levels had risen between 10 and 20 centimeters in the twentieth century. *Id.* at 27.
75. IPCC, 2007 WORKING GROUP I REPORT, "THE PHYSICAL SCIENCE BASIS," SUMMARY FOR POLICY MAKERS (2007) [hereinafter [IPCC 2007 WORKING GROUP I REPORT,]. The author has discussed the IPCC's early work, as well as the United Nations 2007/2008 HDR and the Stern Review, in more detail in McArthur & Harper, *supra* note 47, pt. IV.
76. See Review of Working Group Contributions to the IPCC 5th Assessment Report (AR5) Has Started, IPCC, available at http://www.ipcc.ch/pdf/ar5/review_of_wg_contributions.pdf (last visited May 2, 2012).
77. IPCC 2007 WORKING GROUP I REPORT, SUMMARY, *supra* note 75, at 5. The discussion in this Part presents the international consensus view, as embodied particularly in IPCC reports and work based on its approach, to global warming. It treats that evidence of climate change as serious enough that under any precautionary principle, a principle the United States accepted when it ratified the Framework Convention on Climate Change (*see infra* note 162 & accompanying text), there is enough evidence that a rational world would take steps with a meaningful probability of counteracting temperature increases. It does not mean to suggest that this view is unanimous. *But see No Need to Panic About Global Warming*, WALL STREET JOURNAL, Jan. 27, 2012, at A15, col. 1 (opinion piece against de-carbonization signed by 16 scientists); William Nordhaus, *A Review of the Stern Review on the Economics of Climate Change*, 14 J. ECON. LIT. 686, 687 (2007) (praising Stern Review for adding economic analysis to climate-change analysis, but criticizing various assumptions, particularly low intergenerational discount rate, and claiming that findings of other major studies have been that measures to slow climate change "involve modest rates of emissions reductions in the near term, followed by sharp reductions in the medium and long term."). Nordhaus certainly is correct that the measures used to limit emissions should be the most efficient, and that if the world supply of capital can be sharply increased in current years so that controls are easier to pay for in some definable future, there can be a tradeoff in which countries consume fossil fuels and emit carbon today and pay later. He is also correct that a discount rate near zero is an extremely low discount rate. But his analysis misses the differential effects of climate change on poor countries, the apparently growing risk of what might once have been considered low-probability "tail" catastrophes, and the difficulty that has already been seen in building any collective response to global warming. This is hardly a rational time for inaction.
78. IPCC 2007 WORKING GROUP I REPORT, SUMMARY, *supra* note 75, at 2-3.
79. *Id.* at 5-9.

The 2007 Report projected large additional temperature increases with the likely increase ranging from 2.4º to 6.4º Celsius by the end of the twenty-first century, although the impact of this finding is muted because the report contains probability ranges for various increase scenarios instead of a single prediction.[80] Many scientists treat a 2ºC increase as the outer limit of manageable increases, and a number of them are coming to believe that even this is a too-dangerous increase.[81]

The 2007/2008 United Nations Human Development Report (HDR) cited the Fourth Assessment Report as "establish[ing] an overwhelming scientific consensus that climate change is both real and man-made."[82] The IPCC concluded that keeping global carbon emissions down to 2005 levels will require "a large shift in investment parameters," even though the additional spending, if begun at that time, would have ranged from "negligible to 5-10%" of world GDP.[83] More recently, the IPCC has reported that it now measures the concentration of carbon dioxide at 390 ppm, an increase of another 11 ppm even since its 2007 work.[84]

The IPCC's work accords with the 2006 Stern Review, a report by Sir Nicholas Stern commissioned by Britain's Prime Minister.[85] Stern found rising GHG emissions "the only plausible explanation" for increased temperatures over the last 50 years.[86] The rise "will" affect access to water, food, health, and the environment worldwide.[87] An economist, Stern predicted that failing to act could cost the world 5% of GDP each year "now and forever," with some higher-range estimates rising to as much as 20% of GDP, while the cost of taking corrective action, though great, could be limited to 1% of GDP if remedial action began right away.[88] The next 10 to 20 years — whether the world takes corrective action in the two decades after 2006 — would, he argued, have "a profound effect" on climate in the rest of the century and thereafter.[89] So far, of course, the world has failed to implement any solution with a reasonable probability of effectiveness.

Stern reported that the concentration of CO_2 had increased from 280 ppm in 1750, a benchmark for the preindustrial environment, to 380 ppm, an increase of 100 ppm in roughly 250 years, but would rise another *170 ppm* in just the next 30 to 45 years.[90] Overall emissions, including other greenhouse gases, had risen to 430 ppm of "CO_2 equivalent" and

80. *Id.* at 13.
81. *See, e.g.*, 2007/2008 HDR, *supra* note 54, at 7. For a powerful argument that even the current increase is too much and that we already are experiencing uncontrolled feedback magnification of warming effects, see James Hansen's argument in notes 145-57 & accompanying text *infra*.
82. 2007/2008 HDR, *supra* note 54, at 12.
83. IPCC, 2007 WORKING GROUP I REPORT, *supra* note 75, SYNTHESIS REPORT, at 58.
84. O. Edenhofer et al., *IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, 3 (2011), *available at* http://srren.ipcc-wg3.de/report (last visited May 2, 2012).
85. SIR NICHOLAS STERN, STERN REVIEW: THE ECONOMICS OF CLIMATE CHANGE (2006) *available at* http://www.hm-treasury.gov.uk/d/Executive_Summary.pdf (last visited Apr. 3, 2012).
86. *Id.* at 6.
87. *Id.*
88. *Id.* Writing in 2000, Yale economist William Nordhaus and a colleague estimated that global warming would reduce global GDP by 3%. WILLIAM NORDHAUS & JOSEPH BOYER, WARMING THE WORLD: ECONOMIC MODELS OF GLOBAL WARMING 96 (2000).
89. STERN, *supra* note 85, at 6.
90. *Id.* at 3.

are rising at 2.3 ppm per year.[91] Even if emissions were capped at existing levels, the CO_2 equivalent level of GHG's still would rise to 550 ppm by 2050, an increase of 270 ppm from preindustrial levels.[92]

Worse yet, these dire figures do not fully portray the risk because they are averages. They conceal the "risk of outcomes much worse than expected," risks that "are very real and could be catastrophic."[93] To avoid such catastrophe, the world needed to reduce carbon emissions by 60% to 70% by 2050.[94] As subsequent events have shown, the use of a period this long was unfortunate. It has enabled opponents of change to act as if we still have several decades to negotiate remedies, and only need to implement them at the end of this period. The fact is that every year of delay pushes accumulated emissions higher and makes remedies more costly at any given level of technology.

The IPCC's Fourth Assessment report and the Stern Review were joined by the United Nations' 2007/2008 HDR, which devoted itself to climate change as a threat to human welfare. This HDR described climate change as "now an established fact," one that is "already starting to affect some of the poorest and most vulnerable communities around the world."[95] The crisis is "the defining human development issue of our generation."[96] Continuing emissions are "running up an unsustainable ecological debt that future generations will inherit. We are drawing down the stock of environmental capital of our children."[97]

The HDR noted that developed countries with only 15% of the world's population still were accounting for half of world emissions.[98] To curb rising temperatures, it concluded that these countries would have to reduce carbon emissions by 30% by 2020 and 80% by 2050.[99] It viewed failure to act, which so far characterizes the ineffectiveness of the various treaties and declarations on global warming, as coming from failures of political will, not technological or economic constraints, and claimed (with an eye to the consequences) that the failure would be "a moral failure on a scale unparalleled in history."[100]

91. *Id.*
92. *Id.* at iii.
93. *Id.* at ix. One reason for the impact of the Stern Review was the graphic nature of its warnings. It predicts that temperature increases will release large volumes of stored methane and CO2 from thawing permafrost and peat bogs. *Id.* at 10. Warming will reduce the oceans' ability to continue absorbing carbon dioxide, and, because oceans absorb the great majority of warming's direct effects, warming will create a cumulative increase in heat released back into the atmosphere, even if emissions stop increasing today. *Id.* at 11-12. Climate change may weaken the Atlantic Ocean's temperature circulation in a way that significantly cools Europe and the East Coat of North America. World sea levels will continue to rise, with substantial pressure from the melting Greenland and Antarctic Ice Sheets. *Id.* at 15-16.
94. *Id.* at xii.
95. 2007/2008 HDR Report, *supra* note 54, at 3; *see id.* at 9 (finding an inverse relationship "between responsibility for climate change and vulnerability to its impacts").
96. *Id.* at 7 (HDR predicts that climate change "will undermine international efforts to combat poverty").
97. *Id.* at 9.
98. *Id.* at 14.
99. *Id.* at 127; *see also id.* at 48 (aggressive emission reductions fit a model in which world emissions would fall 50% by 2050). Presumably rapidly rising emissions in Asia have made even the HDR projections of necessary reductions outdated and too low.
100. *Id.*

A 2010 UNEP study of the "emissions gap" between the commitments at the 2009 Copenhagen Conference and those needed to hold temperature increases within 1.5º to 2º Celsius found that even if all existing pledges are implemented, but emissions then stay at 2020 levels for the rest of the century, the expected temperature increase will be between 2.5º and 5º Celsius.[101] Keeping temperatures within Copenhagen's target of a 1.5º to 2º increase would require "emissions levels . . . to be lower in 2020" and "considerable reductions" thereafter.[102]

The most recent HDR, the 2011 report, returns to environmental policy as its central theme because it views global warming as "the great developmental challenge of the 21st century" and rising temperatures as a force that threatens to reverse the positive trend in human development over recent decades.[103] The HDR's good news is that the overall human development index (HDI) has risen "dramatically" by 41% since 1970, and by 61% in low-HDI countries.[104] But this progress has come at a price. The production needed to lift development standards has left 40% of the world's land degraded, caused a wide spread of deforestation and desertification, made the take from fisheries unsustainable, and is a reason that so many species are disappearing.[105] Furthermore, if emissions continue to increase, the expected 19% increase in the overall HDI index by 2050 will instead be 8% to 15% *below* current levels. This is a sharp break from the years of consistent progress since World War II.[106]

The United Nations finds "overwhelming evidence that we are reaching an upper limit to our capacity to emit greenhouse gases without dire consequences," charges that "[w]e are gambling with our planet through 'games' in which private individuals reap the benefits while society bears the costs," and argues that given uncertainties about the capacity of the ecosystem and technology the risk of a "disastrous system-wide collapse is not negligible."[107]

The picture is bleaker when the source of new emissions is considered because so many recent increases are due to economic development in poorer countries — a prime goal of international development efforts. Dividing countries into low, medium, high, and very high HDI countries, the bulk of emissions still come from traditionally developed countries, the very high HDI countries. With only one-sixth of the world's population, these countries accounted for 64% of CO_2 emissions from 1850 to 2005, with the United States responsible for

101. U.N. ENV'T PROGRAMME, THE EMISSIONS GAP REPORT: ARE THE COPENHAGEN PLEDGES SUFFICIENT TO LIMIT GLOBAL WARMING TO 2º OR 1.5º?, TECHNICAL SUMMARY, at 9 (Nov. 2010)
102. *Id.*
103. U.N. DEV. PROGRAMME, HUMAN DEVELOPMENT REPORT 2011: SUSTAINABILITY AND EQUITY, A BETTER FUTURE FOR ALL, at 30-31 [hereinafter 2011 HDR REPORT].
104. *Id.* at 13. Other good news is that the real cost of food is "much lower" than 50 or 200 years ago, and the energy-cost of output in the United States is estimated at one-fifth of that in 1800. *Id.* at 15. Data like these indicate a long-term increase in human welfare. This latest Human Development Report has some good environmental news, too; it recites, for instance, that 25% of the global energy capacity is from renewables, which currently account for 18% of electricity consumed. *Id.* at 9.
105. *Id.* at 4, 37-39. The HDR reports that the average sea level, which has risen twenty centimeters since 1870, is expected to rise thirty-one centimeters from 1990 to 2100 if current accelerated temperature increases continue, and that climate changes are "increasing the likelihood of extreme weather events, such as droughts, storms and floods." *Id.* at 35-36.
106. *Id.* at 2, 30-31.
107. *Id.* at 16-17. The HDR also contains an extended discussion of the relationship between income inequality and environmental degradation and the higher impact on poorer nations that have fewer resources to protect themselves.

30% of total CO_2 emissions in that period.[108] Very high HDI countries cumulatively have generated roughly nine times more carbon per capita than low, medium, and high HDI countries (an added responsibility that, as the HDR points out, is a rationale for the "common but differentiated responsibilities" standard under Kyoto, in which developed countries are to lead in cleanup).[109] In very-high HDI countries, a person causes four times the CO_2 emissions and two times the methane and nitrous oxide emissions of a person in a low, medium or high HDI country, and the activity of a person living in very high HDI countries releases approximately thirty times the CO_2 as those in low-HDI countries.[110]

In recent years, however, the growth in emissions has been coming predominately from developing countries. Rising HDI values have little relationship with emissions at low HDI levels, but as HDI scores rise there is a "tipping point" at which income and CO_2 emissions become correlated.[111] Success in achieving high levels of development, in other words, one of human society's long-term goals, ensures rising emissions levels. Countries that raised HDI levels faster also raised per-capita emissions levels faster.[112] Since 1970, CO_2 emissions in low, medium and high HDI countries have increased by 248% , while those in very high HDI countries have risen at a too-high but much lower rate of 42% .[113] Low, medium, and high HDI countries account for over three-fourths of carbon emissions growth since 1970.[114] A chart of average world temperatures shows increased temperatures taking off after 1980;[115] thus rising temperatures have paralleled, ironically, the period of greatest activity to curb emissions. Of the three main factors that have contributed to rising emissions, population growth, higher consumption, and carbon intensity of production, rising consumption produced a 91% increase on its own, rising population a 79% increase on its own, while carbon intensity has fallen and contributed a negative 70%.[116]

The problem, of course, is that the natural consequence of economic growth, the primary goal of most countries, is to increase the rate of greenhouse gas emissions. Even though "carbon intensity of production" has fallen by 52% in very high HDI countries, total emissions and emissions per capita have "more than doubled" since 1970 and are 112% higher than in 1970.[117] Average world per-capita emissions have also risen 17% over that period. Not surprisingly, success in economic development has gone hand in hand with environmental degradation.

The National Oceanic and Atmospheric Administration publishes an Annual Greenhouse Gas Index of all greenhouse gases. Its most recent index shows that gases have increased by

108. *Id.* at 33.
109. *Id.*
110. *Id.* at 24.
111. *Id.* at 3.
112. *Id.* at 3, 25. As a result, "the evidence is consistent with a causal relationship where rising HDI—or at least the income component—implies higher greenhouse gas emissions in the future." *Id.* at 28.
113. *Id.* at 32.
114. *Id.* at 33.
115. *Id.* at 32.
116. *Id.*
117. *Id.*

29% since 1990.[118] Carbon dioxide, the dominant pollutant, and nitrous oxide have increased steadily since 1990; methane, which was not initially increasing in that period but is twenty-five times more "potent" than carbon dioxide, has risen for the last four years.[119] This is a particular concern because of methane's much greater potency. Far from putting the world on the way to a reduction from 1990 levels by 2012, the FCCC, Kyoto, and the many other international efforts to date have not stemmed the increase in greenhouse gas emissions.

Similarly, the World Meteorological Organization's late-2011 Greenhouse Gas Bulletin reports a 39% increase in carbon dioxide in the atmosphere since 1750 (the benchmark of "pre-industrial levels"), a 158% increase in the lower-volume but much more invasive and longer-lived methane, and a 20% increase in nitrous oxide.[120] CO_2 emissions account for 80% of the increase in recent decades.[121] The emissions, "directly connected with human activity," are linked to burning fossil fuels, deforestation, and land use change.[122] The world has been fortunate (at least, it has been able to buy time) because 45% of the CO_2 emissions from fossil-fuels have been absorbed by "oceans and the terrestrial biosphere."[123] But these two sinks will become less effective, as the Stern Review predicts, as the oceans absorb increasing amounts of CO_2 and forests continue to disappear. Even though no one knows where the tipping point is with absolute certainty, the world is gambling with the uncertainty over whether the cumulative effects of climate change, including feedback effects, have reached a point of no return.

Then there is the grim *World Energy Outlook 2011* from the International Energy Agency (IEA).[124] The IEA report generally focuses on the supply and demand of energy. It considers such practical issues as whether there is sufficient capital investment to satisfy projected energy demand. The report, however, also paints a dire picture of global warming. It describes "the energy decisions necessary to contain the rise in average global temperature to 2º Celsius" as in the category of "decisions that must be made without delay."[125] Even though Kyoto and its progeny have focused on the developed world, the IEA notes that 90% of the population increase in 2010-2035, 70% of the economic growth, and 90% of the emissions increase is expected to come from non-OECD countries — from developing countries, including particularly China and India.[126]

118. *NOAA Greenhouse Gas Index Continues Climbing*, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (Nov. 9, 2011) [hereinafter NOAA], *available at* http://www.noaanews.noaa.gov/stories2011/20111109_greenhousegasindex.html.(last visited August 18, 2012).
119. *Id.*
120. *Green House Gas Bulletin: The State of Greenhouse Gases in the Atmosphere Based on Global Observations through 2010*, WORLD METEOROLOGICAL ORGANIZATION (Nov. 21, 2011), *available at* http://www.wmo.int/pages/mediacentre/press_releases/documents/GHGbulletin.pdf. (last visited August 21, 2012).
121. *Id.* (citing NOAA statistics).
122. *Id.* at 2.
123. *Id.*
124. INTERNATIONAL ENERGY AGENCY, WORLD ENERGY OUTLOOK 2011 (2011). For other summaries of the climate change issue, see DANIEL YERGIN, THE QUEST: ENERGY, SECURITY, AND THE REMAKING OF THE MODERN WORLD, chs. 21-26 (2011); THOMAS FRIEDMAN, HOT, FLAT AND CROWDED 28-49 (2008).
125. 2011 WORLD ENERGY OUTLOOK, *supra* note 126, at 4.
126. *Id.* at 39.

Much of this growth is desperately needed and will achieve major increases in human welfare if accomplished: 1.3 billion people still lack electricity and 2.7 billion still burn biomass for cooking.[127] But raising standards of living for billions of poor, to say nothing of the billions more hoping to achieve developed world standards, will increase emissions even more. Even if cars improve fuel mileage, for instance, the number of cars is expected to double to 1.7 billion by 2035 (with the "center" of automobile manufacturing moving to non-OECD countries).[128] China's energy emissions already are 40% greater than those of the United States, even though its per-capita emissions are only one-third of U.S. levels.[129] Any move closer to the consumption-rich American lifestyle by China or India, however desirable it might be on other grounds, will bring huge new emission increases.

The IEA projects that if the world follows what it labels a "New Policies" scenario, under which countries only implement existing articulated commitments and which is, somewhat discouragingly, the IEA's "central scenario," temperatures will rise by more than 3.5º Celsius.[130] It admits that some prominent scientists now believe that even a 2º rise may be disastrous.[131] Foreseeable consequences of a more than 3.5º temperature increase are "a sea level rise of up to two metres, causing dislocation of human settlements and changes to rainfall patterns, drought, flood, and heat-wave incidence that would severely affect food production, human disease and mortality."[132] A drying Amazon would release more CO_2 and increase the temperature further, as would melting arctic permafrost.[133] In other words, feedback effects begin magnify the increases beyond the already dire assumptions in past IPCC work. And if countries do not implement even their existing commitments, as they generally have not thus far under the Kyoto framework, the trajectory is for an increase of 6º Celsius or more.[134]

The daunting nature of the challenge can be seen in the requirements for the IEA's alternative "450 Scenario" — the bigger steps necessary to cap greenhouse emissions at a 450 ppm CO_2 equivalent and have a 50% chance (but only a 50% chance) of holding temperature increases to 2º Celsius. Even such a relatively limited temperature increase, which until recently seemed to be a consensus target and has been the FCCC-based goal, is beginning to look as if it would have disastrous consequences and is too great an increase.[135] Fully 80% of

127. *Id.* at 39, 45.
128. *Id.* at 41.
129. *Id.* at 208.
130. *Id.* at 40, 69–70, 205, 210.
131. *Id.* at 207.
132. *Id.*
133. *Id.*
134. *Id.* at 40, 210.
135. For the goal of a 2º average temperature increase, see *The Copenhagen Accord*, Draft Decision 1/CP.15 §§ 1-2 (Dec. 18, 2009), *available at* http://unfccc.int/resource/docs/2009/cop15/eng/l1a01.pdf (referencing a goal of holding temperature increase to 2º Celsius) (last visited July 24, 2012); *The Cancun Agreements: Outcome of the work of the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol at its Fifteenth Session*, Decision 1/CP.16 (Mar. 15, 2011), *available at* http://unfccc.int/documentation/decisions/items/3597.php?such=j&volltext=%22cancun%20agreements%22#beg (discussing improving knowledge for keeping the increase to a lower 1.5º rise)(last visited July 24, 2012); for arguments that such an increase is too great, see *infra* notes 143-55 & accompanying text.

the capital stock of power plants, industrial capital, and buildings already is "locked-in"; if measures more aggressive than current "New Policies" are not implemented by 2015, the infrastructure generating 95% of permissible emissions will be in place, and if no steps are taken by 2017, just five years away, *all* of the infrastructure will be installed.[136] Any added carbon-emitting infrastructure after that will have to be matched by offsetting changes, including mothballing existing facilities on whom someone will have to bear the sunk loss. Yet even many of the wealthiest, most developed countries are not on the road to implementing their current commitments. The most recent promises, at the 2011 Durban Conference of the Parties, ignore the need to achieve Kyoto standards and instead authorize development of yet another set of commitments while pushing the date back to 2015, with implementation not having to come until 2020.[137] This is a major retreat, and it teaches precisely the wrong lesson: that there is no urgency about climate-fixing deadlines. In fact, the commitments for developed countries that grew out of Rio and Kyoto must be minimum standards. For temperatures to be kept to a 2º increase or less, all countries will have to do significantly better than current commitments.

The IEA's description of the assumptions behind its 450 Scenario includes changes that, thus far, the world has not shown itself ready to implement (even if some countries pay lip service to them). To achieve 450 Scenario emission levels, all OECD countries would have to have CO_2 pricing systems in place by 2025, and all oil-importing countries would have to end fuel subsidies by 2020, while oil-exporting countries would end subsidies by 2035.[138] The recent mass resistance to Nigeria's effort to end a level of oil subsidies that is crippling other public spending is a reminder of the heroic nature of this goal. The share of fossil fuels in world energy production will have to drop from 81% in 2009 to 62% in 2035; "energy-related" CO_2 emissions in the EU will have to fall to 49% below 2009 levels by 2035, with renewables rising to 43% of energy used by that date; and energy-related CO_2 emissions in the United States will have to drop by 56% from 2009 levels by 2035, while renewables climb to 38% of its energy mix.[139] There will have to be a strong increase in nuclear power, particularly in the non-OECD world,[140] a shift that will require overcoming the reaction to the Fukushima Daiichi nuclear disaster, the failure to resolve the spent fuel disposal problem, and efforts to limit the spread of nuclear weapons. The 450 Scenario model projects $36.5 trillion dollars in energy infrastructure spending in the next twenty-five years, and, ironically, somewhat more in the New Policies assumptions.[141] Delaying increased measures to 2020, which is the natural consequence of the structure of the Durban Platform discussed will require greater expenditures to compensate for higher emissions, with each dollar of investment avoided in

136. 2011 WORLD ENERGY OUTLOOK, *supra* note 126, at 205, 229-235.
137. *See Establishment of an Ad Hoc Working Group on the Durban Platform for Enhanced Action*, Draft Decision CP.17, *available at* http://unfccc.int/files/meetings/durban_nov_2011/decisions/application/pdf/cop17_durbanplatform.pdf (last visited July 24, 2012).
138. 2011 WORLD ENERGY OUTLOOK, *supra* note 126, at 211, 221.
139. *Id.* at 212, 218-19.
140. *Id.* at 212, 214. Increased nuclear generation of electricity could be avoided by substituting alternative renewable fuels, but that the scale of substitution would require a sharp increase in the growth of other renewables.
141. *Id.* at 224-25 (Incl. Fig. 6.10).

the 2011–2020 period estimated to require a $4.30 expenditure between 2021 and 2035.[142] Sir Nicholas Stern warned the world about the sharply rising cost of delay six years ago, but the world has ignored his advice. It will take concerted, persistent effort to do better now.

Perhaps most sobering of all is recent work by NASA scientist James Hansen, whose Senate testimony in 1998 was one of the most significant consciousness-raising events in the United States related to global warming. Hansen has argued that what appears to be the great good fortune of the United States and Canada – that they have massive additional reserves of oil and gas embedded in shale – will be "game over for the climate" if these hydrocarbons, with their concomitant carbon emissions, are produced.[143] A paper he recently coauthored argues that the climate system has "great inertia" because the "4-kilometer deep ocean and 2-kilometer thick ice sheets" absorb heat and slow changes in the natural and human world.[144] This cushioning, which of course is a short-term blessing, is unfortunate because it disguises the larger changes that are underway and encourages delay. Fossil fuel emissions have accelerated since Kyoto, now rising by 2.5% a year instead of the 1.5% of the two decades before that conference.[145] Hansen reviews evidence that the longer-term effects of warming are catching up with the continuous injection of carbon into the atmosphere: (1) the Antarctic summer-sea ice cover was 30% less in 2007 than a few decades earlier; (2) the Greenland and Antarctic ice sheets are shedding ice at an accelerating rate; (3) mountain glaciers are receding rapidly; (4) the area of subtropic climate has expanded; (5) coral reefs are markedly disappearing; and (6) mega-heat waves have become more common.[146] All this has occurred with a temperature increase of less than 1º above preindustrial levels.[147] Moreover, these changes are only the effects of the quickest feedbacks because a few decades are next to nothing in geologic time; "slow feedback" impacts are more difficult to predict accurately, but among their potentially calamitous effects are large-scale methane release from sea beds.[148]

To give a sense of the risk, Hansen reminds us that the ice age was induced by "minor perturbations" in the Earth's orbit and spin, which were amplified as the resulting higher temperatures' melted ice, increased the area of earth's land open to absorbing sunlight, and caused the oceans and soil to release more CO2 and other greenhouse gases.[149] He concludes

142. *Id.* at 235.
143. James Hansen, *Game Over for the Climate*, N.Y. Times (May 9, 2012), *available at* http://www.nytimes.com/2012/05/10/opinion/game-over-for-the-climate.html?_r=1&pagewanted=print" (last visited August 22, 2012).
144. James Hansen et al., *The Case for Young People and Nature: A Path to a Healthy, Natural, Prosperous Future* at 1, *available at* http://www.columbia.edu/~jeh1/mailings/2011/20110505_CaseForYoungPeople.pdf (last visited August 22, 2012).
145. *Id.* A paper just issued by the Earth Land Temperature Project estimates that "global land mean temperature" increased by .87º over the last 50 years, comparing the period 1950-1960 with 2000-2010. Robert Tohde et al., *A New Estimate of the Average Earth Surface Land Temperature Spanning 1753 to 2011*, *available at* http://berkeleyearth.org/pdf/results-paper-july-8.pdf (last visited August 22, 2012).
146. Hansen et al., *supra* note 146, at 5.
147. *Id.*
148. *Id.* at 13.
149. *Id.* at 6.

from changes seen today that the world already is "close to or into the 'dangerous zone,'" with both species and ecosystems plunged into an environment with which they have no "recent evolutionary experience."[150] He charts the well-known likelihood of rising sea levels, expansion of warm climate zones, species loss, coral-reef loss, increasingly extreme storms, glacier disappearance, and decline in human health.[151]

It is appropriate to leave the topic with Hansen's assessment of what is at stake, given that he has long been one of the leaders among mainstream climate scientists. Climate changes will continue to increase if we keep burning fossil fuels even at current levels.[152] In spite of talk about the grave challenge and two decades of conferences and agreements, governments have done nothing to change the "business-as-usual fossil fuel emissions."[153] The costs of inaction will fall on the young and future generations.[154] To Hansen, this is a deep problem of ethics, not just an issue of economics:

> It is a matter of morality – a matter of intergenerational justice. The blame, if we fail to stand up and demand a change of course, will fall on us, the current generation of adults. Our parents honestly did not know that their actions could harm future generations. We, the current generation, can only pretend that we did not know.[155]

B. The Ineffectual World Response to Date: Rio Via Kyoto to Durban.

If so many reports have documented the deepening crisis and kept it on the policy agenda, what has been the response within international environmental law? Is a legal framework in place to achieve the significant emissions reductions needed? How have Bodansky's developing norms and new procedures done in practice in this most critical area?

The legal source of current efforts goes back to the United Nations Conference on Environment and Development in Rio de Janeiro in 1992. Out of that conference came the United Nations Framework Convention on Climate Change, the FCCC, which codified the principles that the signatories agreed should apply to any comprehensive treaty to limit GHG's to levels that "would prevent dangerous anthropogenic interference with the climate system."[156] The FCCC, which the United States ratified, adopted core principles that ever since have guided the faltering international efforts to develop an effective mechanism to cap GHG emissions:

> (1) developed counties will have to lead in reducing GHGs, a duty harbored in the FCCC's language that countries have "common but differentiated responsibilities and respective capabilities";[157]

150. *Id.* at 7.
151. *Id.* at 15-19
152. *Id.* at 20.
153. *Id.; see id.* at 21 ("The transition to a post-fossil fuel world of clean energies is blocked by a fundamental fact, as certain as the law of gravity: as long as fossil fuels are the cheapest energy, they will be burned.")
154. *Id.* at 21.
155. *Id.*
156. FCCC, 1771 U.N.T.S. 107 (Mar. 24, 1994) [hereinafter FCCC]. For a more detailed discussion of the FCCC and the Kyoto Conference, see McArthur & Harper, *supra* note 47, at 770-79.
157. FCCC , *supra* note 158, art. 3.1. As part of establishing differential responsibilities, Annex I listed the developed countries, including the United States, and required that they "shall adopt national

(2) developing countries will not have to reduce emissions immediately,[158] the rationale being that they should be allowed to continue the climb out of poverty that developed countries already have completed;

(3) developed countries will provide funds to assist developing countries through a "Financial Mechanism" that will assist developing-country GHG reductions;[159] and

(4) climate changes should be judged under the precautionary principle, the generally accepted principle of international environmental law that "[w]here there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures."[160]

The FCCC principles were fleshed out in 1997's Kyoto Conference of the Parties, an ambitious global conference that was supposed to operationalize those principles.[161] The resulting Kyoto Protocol contains specific reduction requirements for "Annex I" developed countries, but no requirements for developing countries.[162] Developed countries were to reduce emissions of six GHG's to on average 5% below 1990 levels by between 2008 to 2012.[163] Specific reductions varied by country, with the United States, for instance, a country that increased emissions between 1990 and 1997, to reduce its emissions to 93% of 1990 levels.[164] The Kyoto Protocol followed the FCCC by including a mechanism for developed countries to aid their developing counterparts by creating a "clean development mechanism" (CDM), under which Annex I developed countries could gain credit for reducing emissions in developing countries.[165]

The Kyoto Protocol's reductions of Annex I country emissions to an average of 5% below 1990 levels would not, of course, halt the increase in global warming. But the hope was that the initial steps would begin right away and foster deeper efforts while stimulating new technologies. The disappointing result, beginning with the United States' failure to ratify the Kyoto Protocol and ending with Canada's recent withdrawal, has been much different.[166]

policies and take corresponding measures on the mitigation of climate change." *Id.* Annex B listed their reduction assignments.

158. *Id.* art 3.2, 4.2(a).
159. *Id.* art. 4.3.
160. *Id.* art. 3.3.
161. For a general discussion of the role of a Meeting or Conference of the Parties, see BODANSKY, *supra* note 1, at 119; *see also* KISS & SHELTON , *supra* note 7, at 79-81.
162. *Kyoto Protocol*, art. 3.1-2, Annex I (1998), *available at* http://unfccc.int/kyoto_protocol/items/2830.php (last visited May 2, 2012).
163. *Id.* at 174.
164. *Id.* Annex I.
165. *Id.* art. 12.
166. *See generally* McArthur & Harper, *supra* note 47, at 775–76 (illustrating the failure of the U.S. to ratify the Kyoto Protocol). The deep resistance in the United States is exemplified by the Byrd-Hagel Resolution, which claimed that exempting developing countries from mandatory reductions "is inconsistent with the need for global action on climate change and is environmentally flawed," and that the differences in requirements for Annex I countries and developing countries "could result in serious harm to the United States economy." S. Res. 98, 105th Cong. (1997), The Resolution also gave the "sense of the Senate" that the United States should not sign any protocol or agreement related to the FCCC or the Kyoto Protocol (or subsequent measures) "unless the protocol or other agreement also mandates new specific scheduled commitments to limit or reduce GHG emissions for Developing Country Parties within the same compliance period," and even then should not do so unless the protocol or agreement would not "result in serious harm to the economy of the United States." *Id.* President Bush formally repudiated the Kyoto Protocol in early 2001, after he had campaigned on supporting it. Bush complained that the Protocol "would cause serious harm to the

GHG emissions are mounting so rapidly that no advance in "norms" has been able to keep pace. The Kyoto Protocol included an agreement that developed countries should show "measurable progress" by 2005 in reducing emissions to its weak requirements. That goal, with the United States supposed to be underway to its 7% reduction by 2012, now seems hopelessly optimistic. Recent data from the Environmental Protection Agency shows that this country's GHG emissions increased by 7.3% between 1990 and 2009.[167] In 2010, the United States did indicate its "intent to associate with the Copenhagen Accord" and to reduce emissions by 17% below 2005 limits, a higher benchmark, of course, than 1990 emissions, by 2020, a later date.[168] Presumably most other countries will view this commitment as a floor, not a ceiling, on the country's commitment in the post-Durban negotiations over emission-reduction commitments. But the United States is not on a path to meet even these low commitments. Most other major emitters are also behind on their commitments. Wealthy oil-rich producers, the once progressive country of Canada, and even Japan have increased emissions, while unexpectedly buoyant economies like those in China and India, two countries that are not Annex I countries, have been dramatically increasing emissions since Kyoto as their economies have boomed.[169]

In the last four years, the Kyoto parties have held a series of Conferences of the Parties in an effort to put more flesh on Kyoto's bones: the 13th Conference in Bali, Indonesia in 2007, the 14th in Poznan, Poland in 2008, the 15th in Copenhagen, Denmark in 2009, the 16th in Cancun, Mexico in 2010, and most recently the 17th in Durban, South Africa late last year. The formulaic agreements from the conferences cannot hide the increasing alarm over climate change.[170] They affirm in some ways Kyoto's principles, but the bottom line is that

U.S. economy" and would be "unfair and ineffective." Text of a Letter from the President to Senators Hagel, Helms, Craig, and Roberts, *available at* http:///.whitehouse.gov/news/releases/2001/03/20010314.html (last visited June 21, 2008). Canada also has withdrawn from Kyoto. *Canada Pulls out of Kyoto Protocol*, CBC NEWS (Dec. 12, 2011, 4:00 PM), *available at* http://www.cbc.ca/news/politics/story/2011/12/12/pol-kent-kyoto-pullout. (last visited June 21, 2008).

167. U.S. ENVTL. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990–2009, at ES-3 (2011) [hereinafter 2011 GREENHOUSE GAS INVENTORY], http://epa.gov/climatechange/emissions/downloads11/US-GHG-Inventory-2011-Chapter-2-Trends.pdf. (last visited Feb. 1, 2012). In 2008, the EIA reported a 14.7% increase between 1990 and 2006. McArthur & Harper, supra note 47, at 791 & n. 213. The current numbers are lower, but they also reflect several years of reduced economic activity from the 2008 recession. 2011 GREENHOUSE GAS INVENTORY, supra, at CS-3.

168. *See generally* EMILY C. BARBOUR, COMMENTARY, INTERNATIONAL AGREEMENTS ON CLIMATE CHANGE: SELECTED LEGAL QUESTIONS, S. DOC NO. 7-5700, at 10–18 (Apr. 12, 2012) (discussing the nature of the U.S. commitment on Copenhagen emissions reductions).

169. *See generally* McArthur & Harper, *supra* note 47, at 789–94 (providing a fuller analysis of emission data by country through 2005, including Canada and Japan).

170. *Report of the Conference of the Parties on its Thirteenth Session, Held in Bali from 3 to 15 December 2007*, FCCC/CP/2007/6/Add.1 (Mar. 14, 2008), *available at* http://unfccc.int/resource/docs/2007/cop13/eng/06a01.pdf (last visited Jan. 30, 2012) (interpreting findings in the IPCC's Fourth Assessment Report as showing "that warming of the climate system is unequivocal," that "delay in reducing emissions significantly constrains opportunities to achieve lower stabilization," and that "deep cuts in global emissions will be required to achieve the ultimate objective," and emphasizing "the urgency to address climate change."); *The Copenhagen Accord*, *supra* note 137 (reciting "strong political will to urgently combat climate change in accordance with the principle of common but differentiated responsibilities and respective capabilities;" recognizing "the scientific view that the increase in global temperature should be below 2 degrees Celsius," and

there still is no binding agreement on developed countries' emission reductions or on what, if anything, developing countries will do to counter their growing share of emissions. Moreover, the Durban Conference pushed off until 2015 the timetable to agree on binding reductions, when the vision of Kyoto in 1997, and Rio in 1992, was that the world had to be well on its way to *very* substantial reductions below 1990 emission levels by 2012. As the IEA's report documents, the costs of this failure are growing exponentially.

One factor that has been cited as impeding political support for the Kyoto framework in the United States has been the perceived unfairness of differentiated responsibilities between developed and developing countries.[171] At Durban, if there was a glimmer of hope, it was that the "Durban Platform for Enhanced Action" agrees that the parties will negotiate an agreement that will have "legal force" and in which *all* emitters (developed and developing countries) will have an emissions target.[172] But this agreement is not required to be in place until 2015, and actual implementation (the time "to come into effect and be implemented") is not until 2020.[173] This further delay in implementation deadlines is a major retreat. By 2020, as the IEA has warned, the world is likely to have left a 2º Celsius world behind as a practical matter, unless technology advances at an unprecedented pace, and is likely to be unable even

stating agreement that "deep cuts in global emissions are required according to science, and as documented by the IPCC Fourth Assessment Report . . . "); *The Cancun Agreements*, *supra* note 137, at 2 (describing climate change as "an urgent and potentially irreversible threat to human societies" and noting United Nations Resolution 10/4's recognition that climate change will affect human rights, that its impact will be felt by the most vulnerable part of the world population.) The Cancun Agreements describe the evidence of climate warming as "unequivocal," and that "most of the observed increase in global average temperatures since the mid-twentieth century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations." *Id.* § 3. They ask developed countries to "take note" of their Annex I targets and urges them to increase their targets. *Id.* §§ 36-37. They require developed countries to submit annual inventories and biennial progress reports, and developing countries to submit biennial update reports. *Id.* §§ 40(a), 60(c). They maintain the differentiated framework from Rio by acknowledging that developed countries caused the "largest share of historical global emissions" and therefore have "historical responsibility," and the right of developing countries to make "social and economic development and poverty eradication" among their "first and overriding priorities." *Id.* § III.A Preamble, III.B Preamble. They also discuss strengthening the "long-term global goal" in relation to a global average temperature rise of 1.5º Celsius, a possible lowering of the traditional 2º target. *Id.* § 4. These comments accurately reflect the failure to achieve the hopes of Rio and Kyoto, and the lack of leadership from the countries with the power to implement measures that might realistically begin the process of curtailing carbon emissions.

171. *See* MacArthur & Harper, *supra* note 47, at 813–814, n. 343.

172. *Durban Platform, supra* note 139. Without specifying the final balance between developed and developing countries, the Durban Platform "acknowledg[es] that the global nature of climate change calls for the widest possible cooperation by all countries and their participation in an effective and appropriate institutional response," thus seemingly admitting that developing countries are going to have to play a real role now, not later, that the Convention will require "strengthening the multilateral, rules-based regime", and that "as early as possible," but no later than 2015, there must be a "protocol, legal instrument or agreed outcome with legal force," which is an acknowledgement that the final agreement must have some sanction or other enforcement mechanism. *Id.* Preamble & § 4, Given how intractable the developed/developing split in responsibility has been to progress since Rio, however, the real issue facing the world is not whether developing countries, which have done their part to dramatically worsen twentieth-century emissions by population growth, will have to bear some share of the cost and burden of limiting emissions, but instead is whether they and developed countries will accept limits that realistically can hold temperatures to anything like a 2º Celsius increase.

173. *Id.* § 4.

to halve emissions for a chance to limit temperature increases to a 3.5º rise. The price of several decades delay will be larger temperature increases, with a corresponding acceleration of glacial and polar melting, rising sea levels, rising methane emissions from melting permafrost, more extreme storms, and expanded desert areas. The world community will be in Jared Diamond's category of a social organization that perceived the threat facing it, indeed was able to document it in excruciating detail and spread that knowledge through rapid computerized information transmittal, but was unwilling to set aside its self-interest, protect the world for future generations, and make the quite feasible, albeit expensive, changes necessary to escape severe environmental degradation.

The failures to date are a problem for the world, but the effects of long-term climate change are likely to be harder for poorer developing countries to surmount than for wealthy nations. The dismal record on emissions reduction is also an American tragedy. The identification of a major problem goes back at least to Rio, a time when the United States still led the world economy and had outsized political influence. The Soviet Union was in the process of dissolution; Chinese economic power had not yet begun to alter the world stage. Particularly because developing countries understandably looked to their developed brethren who accounted for most historical GHG emissions to set an example, it was an ideal occasion for the United States to lead the world and set a positive example of American exceptionalism. The opportunity was squandered. Domestic politics were elevated above the world's need to solve this crisis and above the United States' long-term international interests. This failure of vision is reflected in the Byrd-Hagel Resolution and President Bush's failure to live up to his campaign promises to support Kyoto.[174]

The loss to the United States threatens to be economic as well as political. As Thomas Friedman has argued, the United States has had an opportunity to give American auto manufacturers, inventors and manufacturers of renewable energy infrastructure, owners of other American industrial plants, oil companies, and large utilities a clear economic incentive to sink funds and effort into inventing cutting edge technology.[175] This was a major opportunity for American companies to take the lead in what clearly will be a major new international market. But just as automakers for years fought higher fuel-efficiency standards and ceded the market for high-mileage cars to foreign makers, so many other American companies spent more effort resisting regulation than courting its opportunities. The result is that firms in Germany, which imposed much higher standards and subsidized solar power, and China, whose firms with their mix of public and private controls are beginning to move aggressively into renewable energy production, are likely to lap their potential competitors in the United States. This loss is particularly tragic because the multinational oil companies based in the United States and large electricity generators still have the skills, distribution networks, and business acumen to out-compete many other companies in the same market if they receive the right market signals.

174. *See* Byrd-Hagel Resolution, *supra* note 168; McArthur & Harper, *supra* note 47.

175. The economic opportunity for the United States, and risk that it will miss it, is the meta-theme of Thomas Friedman's *Hot, Flat and Crowded*. FRIEDMAN, *supra* note 126. Friedman's plea would be even more impassioned today, now that the country has lost over three more years without seizing the main chance.

Finally, the idea that the United States can avoid GHG emission controls for reasons of domestic politics is extraordinarily short-sighted, and the benefits of inaction only temporary. The United States is the only major country in which the precautionary principle is ignored and a leading political party devotes its efforts to demonizing scientific outcomes. In the years since Kyoto, the European Union has begun making major legal changes to limit emissions. China, which faces a severe environmental problem,[176] is putting a cap-and-trade market in place. It is highly unlikely that as competitor countries begin to feel the cost of limiting emissions, they will be willing to let the United States continue to pollute without sanction.

France's former President Nicolas Sarkozy floated a trial balloon several years ago by suggesting imposition of a "green tariff" on "those countries that don't play by the rules of the game on environmental protection."[177] He did not gain support then, but similar ideas are likely to resurface when those bearing the costs of emissions control grow frustrated with free riders. The costs to the United States of its failure to deal with global warming rationally will only grow with time. The rise in temperatures will remind the rest of the world that this country, until recently the largest GHG emitter and still the country with the highest per-capita emissions, has stood as a barrier to effective remedies for almost two decades. And not only has President Obama muted any support for strong global-warming measures, but only one major Republican candidate has treated global warming seriously.

V. The Race Against Time.

Where does this leave the world? The increasing documentation of the problem has not been matched by ramped up efforts to solve it. The IEA was right to damn recent conferences with faint praise.[178] It is one of history's greatest ironies that one of the most hopeful signs on the horizon is that the Chinese government seems to have determined that climate change poses a mortal threat to China, and also that the renewables market is one in which its businesses should lead. The country that should have established a lead decades ago, the United States, is largely staying on the sidelines.

The problem, of course, is that even if one is optimistic about the ability of international environmental law to devise solutions for single-issue problems over time, and to do so without a hierarchical court system or strong compliance measures, global warming is one problem in which all major economies need to rise to the challenge and the cost of delay in

176. *See, e.g.*, DIAMOND, *supra* note 68, at 377 (displaying Diamond's simultaneous pessimism about the scope of China's environmental degradation, and his hope that, because it is a large country with a powerful central government, if it gets behind limiting emissions it may be able to move much more quickly than other large economies).

177. *Turning Pledges into Law: EU Commits to Year-End Climate Deadline*, SPIEGEL ONLINE INTERNATIONAL (Mar. 14, 2008), *available at* http://www.spiegel.de/international/europe/0,1518,541565,00.html (last visited August 20, 2012).

178. It is not accidental that the IEA talks about the last year as not "a good one for those concerned about the contribution of energy-related carbon-dioxide (CO2) emissions to climate change," and about Cancun as a conference "when a heroic leap was needed to set the world on an emissions trajectory compatible with the stated long-term target of limiting the average global temperature increase to 2ºC" [a leap that obviously was not attempted], that the pledges associated with the Copenhagen Accord and Cancun Agreements were "not sufficient to put the world on a climate-sustainable path," and that there was a "lack of ambition of climate pledges for 2020." 2011 WORLD ECONOMIC REVIEW, *supra* note 126, at 206, 209

instilling new norms is huge. Even Bodansky, for all his optimism, admits, "Over the long term, it is difficult to see how a problem such as climate change could be addressed without giving international institutions greater standard-setting and enforcement authority. Nevertheless, efforts to do so would raise major practical and theoretical challenges."[179]

Without such a stronger international network, how can this soft system with its vague edges rise to the comprehensive solutions needed to treat global warming? How can one reconcile Bodansky's optimism that there is a trend toward compliance with international environmental law, and that the last few decades have witnessed the development of effective new techniques of reaching agreement, with the demonstrated unwillingness of so many major countries to accept binding limits on GHG emissions, and his admission that "international environmental law has been weakest with respect to problem-solving effectiveness"?[180] That the gradual evolution of norms, if they are moving in a progressive direction may "set boundary conditions for the development of more precise behavioral rules" and "frame the debate rather than [] govern conduct,"[181] hardly seems enough to overcome so much self-interest, the drive of so many nations to improve standards of living, the tight budgets of a recessionary world economy, and the allure of trying to assign blame for past emissions rather than accept the cost of solving the problems as it exists today.

Perhaps the most that can be said is that history is not written in advance, but instead by men and women in their own time. Even the reports charting the worsening problem still contend that there is time and technology enough today to limit global warming if we only have the will. This challenge poses the real test of whether international environmental law, even if "soft" in nature," is "hard" enough in impact to keep GHG's to livable limits. We had better hope that Bodansky's optimism about the effectiveness of international environmental law's relatively new techniques and its growing sophistication proves correct.

179. BODANSKY, *supra* note 1, at 268.
180. *Id.* at 261-62. Bodansky also admits that for all his emphasis on norms and general principles, if asked whether international environmental norms are truly customary in nature, "[t]o a significant degree, the honest answer is, we do not know." *Id.* at 197.
181. *Id.* at 203.